

amplitudes of the third and fourth partials for voices 1, 3, and 5 at various pitches. The place where a somewhat sudden change happens is marked by a vertical bar.

TABLE III.—*Third Partial.*

Pitch of third partial.	$g''$	$f''\sharp$	$f''$	$e''$	$d''$	$c''$	$b'$	$a'$	$g'$	$f'\sharp$	$f'$	$e'$
Voice 1	1'5	1'5	1'3	2'5	2'7	4'5	7'3	8'2	6'1	2'8	6'1	1'1
" 3	0'1	0'2	—	0'4	0'2	1'1	3'5	—	4'6	2'9	2'5	3'5
" 5	0'5	0'2	1'3	1'0	0'3	1'5	6'4	5'6	—	2'3	1'5	2'2

TABLE IV.—*Fourth Partial.*

Pitch of fourth partial.	$c''$	$b''$	$b''\flat$	$a''$	$g''$	$f''$	$e''$	$d''$	$c''$	$b'$	$b'\flat$	$a'$
Voice 1	1'0	1'4	0'8	2'2	0'6	0'4	0'7	1'6	3'3	3'1	4'7	2'9
" 3	0'4	0'4	—	0'4	0'2	0'3	0'5	—	3'5	2'8	3'6	3'9
" 5	0'3	1'4	0'7	0'8	0'6	1'3	1'3	0'5	—	2'5	1'5	2'1

It will be seen that the third partial springs into prominence more suddenly with voices 3 and 5 than with voice 1, but there is a rapid increase with voice 1, where the sudden change occurs with the other voices. This want of continuity suggests an adjustment or tuning of the mouth cavity, an idea which receives support from experiments on the sound  $\bar{a}$ , to be afterwards described.

Another very marked example of this sudden introduction of a new partial was given by voice 6, a powerful bass.

Note sung	...	...	$B\flat$	A	G	F
Fourth partial	...	...	7'5	8'0	4'5	0'8
Fifth partial	...	...	0'9	1'2	0'9	3'4

The apparent tuning of the mouth cavity required to produce the sudden introduction of a new partial might perhaps be described as the involuntary selection of a new  $\bar{o}$  of different quality, but better adapted to be sung on the new note. We do not reject this mode of considering the phenomenon, but at the same time point out that there is a generic property common to the  $\bar{o}$ 's above and below the critical notes which leads us to regard all the varieties as sensibly one and the same vowel sound. Our experiments do not so far show whether any tuning takes place in the upper part of the scale, where nothing but a prime and its octave are present.

5. Whenever a partial falls on  $b'\flat$  we find that it is specially prominent. This fact was ascertained by Helmholtz; and the confirmation of his experiments by a completely different method is very satisfactory, both as showing that the letter  $\bar{o}$ , as pronounced by the English and German singers, did not differ sensibly, and as tending to justify our confidence in the method of investigation which we have followed. In that part of the scale where the vowel consists simply of the prime and its octave, the second partial, when it falls on  $b'\flat$ , is usually a maximum, both absolutely and relatively to the prime. This result was to be expected from the experiments of Helmholtz and Donders.

6. The upper partials are often larger in amplitude than the prime.

The second partial was occasionally a little more than double the prime; the third partial in low notes was sometimes four times as great as the prime. The fourth partial was in one case eight times as large as the prime and the fifth partial in our single example on F was one and a half times the prime.

We defer drawing any conclusions from these results until we have described the analogous phenomena observed for the vowel sound  $\bar{a}$ .

FLEEMING JENKIN  
J. A. EWING

## NOTES

PROF. F. V. HAYDEN has recently been elected Foreign Member of the Royal Academy of Sciences, Rome. This is one of the oldest scientific societies in the world, and the number of foreign members in the department of the natural sciences is only thirty-seven. The University of Rochester (U.S.) at its annual commencement on the 3rd instant, conferred on Dr. Hayden the honorary degree of Doctor of Laws. In his letter communi-

cating its action, the president, Rev. Dr. M. B. Anderson, says:—"The Trustees and Faculty of the University desired to recognise by this action your great services to science through your personal attainments, as well as the almost unparalleled energy and success which have characterised your explorations in regions hitherto unknown to the geologist as such. They did not hope to add in the slightest degree to your well-earned reputation, but they desired to express their appreciation of the honour you have done our country and the state and city of your early residence, by those great labours which have linked your name with geological science for all coming time. The friendship of many years has made my official connection with this public act a source of the most sincere pleasure."

THE Netherlands Zoological Society held its annual summer meeting at Harlingen on July 14 last. The chairman of the Committee for the Zoological Station, Dr. Hubrecht,<sup>†</sup> gave a short statement showing how the prospects of the young institution had considerably improved during the past year, how an annual income of about 150% had been obtained, which had permitted an extension of the wooden building, described and figured in NATURE, as well as the application of a new heated air motor (system Rennes, Utrecht) for oxygenising the sea-water in the aquaria by a constant stream of atmospheric air. The transportable Zoological Station has been erected during the summer months of 1878, on the Island of Terschelling, between the Zuyder and North Seas, and several members of the Society are there now, for the greater part occupied in the study of the invertebrate fauna of the Dutch coast. These investigations are being considerably facilitated by the great liberality of the Marine Minister, who has put a vessel with a mate and three sailors at the entire disposal of the Committee for the next six or eight weeks. As has hitherto been done, it is expected that at the end of the season a circumstantial report will be issued by the Committee, in which the results of this year's campaigning will be duly recorded.

THE death is announced of Dr. Thomas Oldham, who was, from its origination in 1850 till 1876, at the head of the Geological Survey of India. It was under his direction that the official geological survey was commenced, first under the Hon. East India Company and afterwards as part of the Government public service; and until his retirement, from ill-health, he had the control of the issue of the official geological maps, as, portion by portion, the work was completed, and the issue of the memoirs explanatory of the maps. In 1861, eleven years after the survey was commenced, he originated the publication of the folio-sized "Palaeontologia Indica," which consisted of plates, with descriptive letter-press, illustrating the fossils of the country, and the work has progressed steadily in fasciculi as an official publication printed by command of the Governor-General of India. Dr. Oldham was born in Dublin in May, 1816, and entered at Trinity College, Dublin, at the age of sixteen. After taking his B.A., he studied in 1837-38 at the engineering school of Edinburgh, and attended Jameson's lectures on geology and mineralogy. Returning to Ireland in 1839, he became chief geological assistant to Major-General Portlock, then at the head of the survey of Ireland, and he helped in the preparation of the well-known report on Londonderry, Tyrone, &c., published in 1843. After being for a while curator and assistant-secretary of the Geological Society of Dublin, he held for a year the professorship of engineering, and in 1845 succeeded the late Prof. John Phillips as Professor of Geology. He was then appointed local director of the geological survey of Ireland, and the Geological Society of Dublin elected him its president. After the various experiences thus gained, in 1850 he was appointed to organise the geological survey of India. There were many unexpected difficulties to

contend with, but during the sixteen years of his office these were more or less overcome. Besides being elected a Fellow of the Royal Society in 1848, he received the Royal medal of the Society in 1875. The Emperor of Austria conferred on him a medal in recognition of his work. The papers he wrote, apart from his official work, were not numerous. He died at Rugby July 17.

It has been arranged that Prof. McKendrick, as President of the Physiological Section at the meeting of the British Medical Association in Bath, will give an address on the recent progress of acoustics, more especially as regards the mechanism of the ear.

At a meeting recently held at Netley of the subscribers to the Parkes Memorial Fund, it was resolved—1. That a prize of one hundred pounds in money, and a large gold medal bearing the portrait of the late Dr. Parkes, be given triennially for the best essay on a subject connected with hygiene, to be declared at the commencement of each triennial period, the prize to be open to the medical officers of the army, navy, and Indian services of executive rank on full pay (with the exception of the officers of the Army Medical School during their term of office). 2. That the subject for the first competition for the above-named prize be as follows:—"On the Effects of Hygienic Measures in arresting the Spread of Cholera." 3. That the essays be sent in to the Committee of the Parkes Memorial Fund, care of the Director-General, Army Medical Department, 6, Whitehall Yard, London, S.W., on or before December 31, 1880. Each essay to have a motto, and to be accompanied with a sealed envelope bearing the same motto, and containing the name of the competitor. 4. That a bronze medal (also bearing the portrait of the late Dr. Parkes) be given at the close of each session of the Army Medical School to the best answerer at an examination in hygiene.

At p. 104 of this volume we called attention to an additional exception to one of Fermat's remarkable statements regarding the forms of primes. The discoverer, M. Pervouchine, has lately succeeded in showing that

$$2^{23} + 1$$

(a number containing many more than *two millions and a half* of places of figures) is divisible by the prime number

$$167,772,161$$

or

$$5 \cdot 2^{25} + 1.$$

This result has been verified by Zolotareff of the St. Petersburg Academy of Sciences. We are not told what method he employed, but it is obviously reduced to a question of mere labour by the use of the binary scale. And even this labour may be dispensed with by the aid of very simple machinery. It is much more difficult to see how M. Pervouchine was led to choose this divisor, though it would appear that the divisor was probably first assumed and the dividend calculated from it.

THE annual meeting of German Archæologists and Historians will take place at Marburg about the middle of September.

THE American Minister for Agriculture has recently stated that in the extensive caverns of Texas enormous masses of guano are deposited. The quantity is estimated at 20,000 tons, and the quality is said to be superior to that of fish guano. Its origin must be looked for in the immense numbers of bats which inhabit these caverns. It is also reported that in the Indian Ocean several guano islands have been discovered, so that the threatened exhaustion of guano deposits need not be feared for some time to come.

In different parts of Costa Rica grasshoppers have appeared in alarming masses, particularly near Herodia, Alajuela, and

Atenas, one of the most cultivated and fertile districts of the whole country. The coffee crop for this season has been nearly all destroyed by the plague.

At a recent meeting of the Geneva Society of Physics and Natural History, Prof. Alph. de Candolle presented a glass jar containing fruits of the coffee plant collected before maturity in Mexico, preserved in a liquid which chemical analysis proved to be salt water. It is fifty years since the jar thus filled was hermetically sealed, under the eyes of Aug.-Pyr. de Candolle, and to-day the coffee-beans which it contains are in a thoroughly satisfactory state of preservation. The water contains a solution of chloride of sodium and very small quantities of other chlorides or salts. No gas was found in solution; the water must then have been boiled, and introduced while hot into the jar. This experiment may give valuable hints as to the substitution of salt water for alcohol (of which every one knows the inconvenience) for the preservation of organic substances.

THE Japanese Government have finally authorised the immediate commencement of a line of railway between Kiôtô and Otsu, which is expected to cost nearly a quarter of a million sterling, and will probably be completed in three years. The construction of this line will have a beneficial effect upon that part of the empire, as it will afford a much needed outlet for the valuable products raised at Tsuruga, and in the rich districts in the neighbourhood of Lake Biwa.

THE Government engineering works at Shindin are a conspicuous proof of the enterprise of the Japanese, and it is satisfactory to learn from the Japan papers that the undertaking is in a highly prosperous condition. It was formed by combining the Kaga Foundry, originally started by the Daimio of Kaga in 1869, with the Vulcan Iron Works, which were bought by the government in 1872. The foreign staff at present consists of only four persons, and the works give employment to nearly a thousand skilled mechanics, exclusive of ordinary labourers. In addition to several works which have been recently executed, there are said to be sufficient orders on hand to occupy the staff for the next three years. The evidence which this establishment exhibits of the rapid development of internal trade is very satisfactory to all who watch with interest the progress of Japan.

"NOMENCLATOR STRATIGRAPHICUS: a Hand-book of the Nomenclature of the Sedimentary Rocks," by G. A. Lebour, F.G.S., is the title of a work which has been in hand for several years, consisting of a list—as complete as may be—of the subdivisions of the geological scale now or at any time in use in this country or abroad. The names are arranged in alphabetical order as the easiest for reference. The date of publication, the meaning when it seemed necessary, and the equivalence, are also given. The volume will be of at least 250 pp., and will be published as soon as the number of subscribers has reached 200. Information may be obtained from Mr. G. A. Lebour, 2, Woodhouse Terrace, Gateshead-on-Tyne.

THERE are very few botanical gardens, colonial or foreign, that can boast of such a carefully-prepared or extensive catalogue as that which Dr. Schomburgk has pronounced of the plants under cultivation in the Government Botanic Garden, Adelaide, South Australia, now before us. It comprises 285 pages; and not alone on the score of bulk, but also with regard to its contents, it is something more than a mere catalogue. The plants are arranged under their natural orders, the scientific and common names and native countries being given also. We are told whether the plant is a tree or shrub, a climber, a trailing, or a creeping plant, annual, biennial, or perennial, evergreen or deciduous, out-door or stove-plant. Besides all this are too good indices, one of English and the other of Latin names. From the preface a very good idea may be had of the climate and meteor-



ology of Adelaide, as well as of the behaviour of introduced plants from various parts of the world. The sudden changes of temperature during the Australian summer months of December, January, and February, are often very injurious to vegetation. The lengthened period of eight or ten weeks without a drop of rain, which is not uncommon, has a serious effect upon both indigenous and acclimatised plants. In the months of March, April, and May, when our own deciduous trees are putting on their fresh green foliage, the same identical European plants which have established themselves in their Australian home are assuming their autumnal tints and dropping. Alpine and tropical plants suffer in South Australia not only from the dry atmosphere, but—the tropical ones especially—from the cold of the winter months. On the other hand, the extreme heat in the month of January, coupled with the hot north wind, literally bakes the fruits upon the trees. At three o'clock in the afternoon of the 10th of January last, it is stated that the thermometer in the Botanic Garden registered  $116^{\circ}$  in the shade and  $166^{\circ}$  in the sun. The catalogue is illustrated by seventeen full-page views in the garden, engraved from photographs.

WE have before us quite a pile of *Reports* and *Proceedings* of provincial societies, all of which, we may say, appear to be in a prosperous and healthy condition. We can do little more than give the names of the societies which have issued these reports. As usual, the *Natural History Transactions* of Northumberland, Durham, and Newcastle-on-Tyne contain some papers of great importance. A paper on Eggs, by Dr. Embleton, and one on Roman remains at South Shields, by the Rev. Dr. Hooppell, deserve special mention; there are also some interesting Bewick letters. The preface to the *Report* of the Rugby School Society is rather desponding, but the contents are really creditable to the contributors, and we are glad to see the attendance is generally very good; in the *Report* on the Temple Observatory, a description and plan of the new buildings is given. The eighth *Report* of the Wellington College Society shows it to be in a state of vigorous activity, all the departments adding largely to their collections; an ethnological department has been set on foot. Besides the above we have received the *Proceedings* of the Belfast Natural History and Philosophical Society; the *Report and Proceedings* of the Manchester Field Naturalists and Archaeologists; *Proceedings* of the Birmingham Philosophical Society; *Eighth Annual Report* of the Leeds Naturalists' Club; *Annual Report and Transactions* of the Plymouth Institute and Devon and Cornwall Natural History Society; *Proceedings* of the Liverpool Naturalists' Field Club; *Seventh Report* of the Croydon Microscopical Club; *Report* of the Northampton Natural History Society and Field Club; and the *Eighth Annual Report* on the Devon and Exeter Albert Memorial Museum, &c. Several of these publications contain really important papers which deserve a wider circulation than they are likely to receive in their present form. In this connection we may mention an interesting tractate published at the *Advertiser* office, Wilmston, containing an account of some Lancashire Artisan Naturalists, by Mr. A. A. Reade. From abroad we have received the *Papers and Proceedings* of the Royal Society of Tasmania; *Proceedings* of the Linnean Society of New South Wales; *Report* of the Auckland Institute; *Report* of the Dunedin Naturalists' Field Club, and the *Bulletin* of the Essex (U.S.) Institute.

THE temperature of flames has been investigated by Signor F. Rosetti (*Istituto Veneto*, ser. v. vol. iv.) in a very thorough manner by means of his ingenious calorimeter. The maximum temperature of a Bunsen flame is found to be  $1,360^{\circ}$  C., and results from a combustion of 1 volume of gas and  $2\frac{1}{2}$  volumes of air. The admission of a greater or less quantity of air reduces the temperature. Changes in pressure have but slight influence on the

temperature. The flame given by gas diluted with the same volume of nitrogen shows a temperature of  $1,180^{\circ}$ , and diluted with 3 volumes of nitrogen,  $1,040^{\circ}$ . The same degrees of dilution with carbonic acid show respectively  $1,100^{\circ}$  and  $780^{\circ}$ . Among other temperatures noted were the following:—

Locatelli lamp	...	...	...	...	...	920
Stearine candle	...	...	...	...	...	940
Petroleum lamp with chimney	...	...	...	...	...	1,030
The same without chimney—						
Illuminating part	...	...	...	...	...	920
Sooty envelope	...	...	...	...	...	780
Alcohol lamp (alcohol 0.912)	...	...	...	...	...	1,170
Ditto (alcohol 0.822)	...	...	...	...	...	1,180

The slight difference in heating power resulting from widely-varying percentages of water in the alcohol is worthy of remark.

THE medical students of Paris have not forgotten that Rousseau was a botanist as well as a philosopher, and sent a delegation on July 2 to Ermenonville to celebrate the 100th anniversary of his death. Three addresses were delivered in the name of the medical body—one by Dr. Bergeron, the toxicologist, the second by M. de Lannessau, and the third by M. Baillon, himself a botanist and a professor of the School of Medicine. The speakers referred in eloquent terms to the love of Rousseau for nature, his observational genius, and his works on botany. The students had prepared a splendid crown made of *pervenches* (periwinkle, *Vinca*) the flower which Rousseau loved best, and which had been collected by them in the very forest where the philosopher spent his last years. As no boat was to be had to reach the island where the author of the "Nouvelle Héloïse" is buried, one of the students threw himself into the water and swam with the testimonial to the spot sacred to the memory of the impulsive Frenchman.

H. J. RINK has recently laid before the Dutch Academy of Sciences an elaborate paper on the alterations caused by changes of temperature in the resistance offered by mercury to the passage of the galvanic current. The coefficients found hitherto range between 0.00086 and 0.00104. The author has made experiments with seven tubes of mercury, each a metre in length, and after making all corrections for expansion of glass, &c., obtained the number 0.000989 as the coefficient for the change in the resistance corresponding to an alteration of a degree Celsius. He finds, furthermore, that the resistance increases in a more rapid ratio than the temperature.

THE great Giffard captive balloon is in the hands of a Commission appointed by the Prefect of the Seine, and composed of M. Troost, Professor of Physics at the Sorbonne, Capt. Renard, head of the balloon service of the War Office, and a few others. The Commission was appointed on July 19, and on the 20th paid its first visit to the balloon, which is attracting public notice to an unprecedented degree. Thousands of spectators look through the railings of the Cour du Carrousel at the stupendous sphere which is ready to start for its elevated station. On the 20th the wind was very violent, and no ascent was tried. The balloon will not be opened to the public before the Commission has rendered its report. A second visit took place on the 21st, when a successful trial ascent was made. A M. Carrol has designed and made wings for directing an elongated balloon. A man will be suspended under it by a rope and will try to direct it. This kind of experiment has been tried at Paris twice—by Deghen, a Viennese clockmaker, about seventy years ago, who failed; and a year ago at la Villette gasworks, by a policeman, who obtained no result. M. de Fonvielle writes that he visited the Carrol flying machine which is yet imperfect, but may eventually work. The balloon will be inflated with hydrogen gas, and the

man engaged to work the wings is an acrobat of effective muscular power. The experiment will very likely take place at Enghien, on the lake, where the balloon will be retained by a small floating buoy.

WE have received a "Catalogue des Ouvrages d'Astronomie et de Météorologie," found in the principal libraries of Belgium, prepared at the Royal Observatory of Brussels. It extends to upwards of 630 pages, and will be found of great service to those interested in astronomy and meteorology. The publisher is Hayez, of Brussels.

IN our report last week (p. 323) of the Physical Society meeting of June 22, in Mr. W. Baily's paper, the expression  $A \cos \theta$  should be  $A \cos 2\theta$ , so that the equation to the ellipse of polarisation would be

$$1 + A \cos 2\theta + B \sin 2\theta = r^{-2} \{1 - (A^2 + B^2)\}$$

The author of the paper on Complementary Colours was Mr. John Gorham, not Graham.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. Enoch; a Rhesus Monkey (*Macacus erythraeus*) from India, presented by Miss Davis; a Cape Zorilla (*Ichonyx zorilla*) from Africa, presented by Mrs. J. J. Monteiro; a Common Cuckoo (*Cuculus canorus*), European, presented by Mr. G. D. Careless; three Alligator Terrapins (*Chelydra serpentina*) from North America, presented by Mr. J. H. Thompson, C.M.Z.S.; a Chimpanzee (*Troglodytes niger*) from West Africa, a Golden-headed Marmoset (*Midas chrysomelas*) from Para, two Egyptian Flamingos (*Phoenicopterus antiquorum*) from North Africa, deposited; an Eland (*Oreos canna*) born, five Amherst Pheasants (*Thaumalea amherstiae*), an Argus Pheasant (*Argus giganteus*) bred in the Gardens.

### JOSEPH BLACK<sup>1</sup>

THE study of the history of a science is of great importance not only from a psychological point of view, but also as throwing light on the present position of the science. In science, as in other natural products which have *grown*, we find survivals which can only be understood when the development is known. Such historical studies may very conveniently be associated with the biographies of the great scientific leaders under whom progress has been made, and whose individual mental peculiarities have left permanent impressions. I intend on this occasion to direct your attention to the life and work of Dr. Joseph Black both because he was one of the first to give to chemistry the direction which it still preserves, and because his life is of special interest to us as Edinburgh students of chemistry.

Joseph Black was born at Bordeaux, in 1728. His father, John Black, was a native of Belfast, a member of a Scottish family settled in Ireland. His mother belonged to the family of Gordon, of Halhead, in Aberdeenshire, and was a cousin of Dr. Adam Ferguson. In 1740 he was sent home and educated at the Grammar School of Belfast. In 1746 he matriculated at the University of Glasgow, where he remained till 1750, studying in the faculties of arts and medicine. He then removed to Edinburgh, where he graduated as doctor of medicine in 1754. In 1756 he was appointed Professor of Anatomy and Lecturer on Chemistry in the University of Glasgow. He soon exchanged with a colleague the duty of teaching anatomy for that of physiology, and continued to lecture on physiology and chemistry till 1766, when he was called to Edinburgh to succeed his friend and teacher, Dr. Cullen, in the Chair of Chemistry. He died November 26, 1799. Such is a brief sketch of his quiet and

uneventful life. His contemporaries Dr. Robison and Dr. Adam Ferguson, give us some account of his manner of life and study. He was minutely accurate and careful in everything he did, and this punctiliousness and his feeble health account for the small *quantity* of work of which he has left a record. As a student he is said to have kept two sets of note-books; into one he entered observations, experiments, hints of experiments, extracts from the works of others, in fact all the miscellaneous additions to his knowledge. These he afterwards transcribed into the other set, arranging them in order of subjects. "In short," to quote Dr. Robison, "he kept a journal and ledger of his studies and posted his books like a merchant." It has occurred to me that possibly this mention of Dr. Black's business-like habit may have been present to the mind of Sir Walter Scott when describing the interview of Francis Osbaldistone on his return from Bordeaux, with his father. "—but what have we here? 'Bordeaux founded, castle of the Trompette, palace of Galienus,'—well, well, that's very right, too. This is a kind of waste book, Owen, in which all the transactions of the day, emptions, orders, payments, receipts, acceptances, drafts, commissions, and advices are entered miscellaneously." "That they may be regularly transferred to the day-book and ledger," answered Owen; "I am glad Mr. Francis is so methodical."

His style as a lecturer is well described by Dr. Robison:—

"He endeavoured every year to make his courses more plain and familiar, illustrating them by a greater variety of examples in the way of experiment. No man could perform these more neatly and successfully. They were always ingeniously and judiciously contrived, clearly establishing the point in view, and never more than sufficed for this purpose. While he scorned the quackery of a showman, the simplicity, neatness, and elegance with which they were performed were truly admirable . . . his students were not only instructed, but (they knew not how) delighted; and without any effort to please, but solely by the natural emanation of a gentle and elegant mind, co-operating, indeed, with a most perspicuous exhibition of his sentiments, Dr. Black became a favourite lecturer." His private life was one of unvaried regularity and order, and was brought to a fit close by his death, which is thus described by Dr. Adam Ferguson.

"His own constitution never was robust, and every cold, or any approach to repletion, affected his breast so much as to occasion a spitting of blood. This he guarded against by restricting himself to a moderate or abstemious diet. As his infirmities increased with age, he met them with a proportionate attention and care, regulating his food and exercise by the measure of his strength; and thus preventing the access of disease from abroad, he enjoyed a health, which was feeble but uninterrupted, and a mind undisturbed in the calm and cheerful use of his faculties. A life so prolonged had the advantage of present ease, and the prospect, when the just period should arrive, of a calm dissolution. This accordingly followed on the 26th of November, 1799, and in the seventy-first year of his age, without any convulsion, shock, agitation, or stupor, to announce or retard the approach of death. Being at table with his usual fare—some bread, a few prunes, and a measured quantity of milk diluted with water, and having the cup in his hand when the last stroke of his pulse was to be given, he appeared to have set it down on his knees, which were joined together, and in this action expired, without spilling a drop, as if an experiment had been purposely made, to evince the facility with which he departed. So ended a life which had passed in the most correct application of reason and good sense to all the objects of pursuit which Providence had prescribed in his lot." . . . "He had long enjoyed the tender and affectionate regard of parents whom he loved, honoured, and revered, with the delightful

<sup>1</sup> Abstract of Lecture to the Edinburgh University Chemical Society, by Prof. Crum Brown, F.R.S.